DRIVEN TO EXCESS: AN ANALYSIS OF THE CAUSES OF YOUNG MALE DRIVER DEATHS AND INJURIES

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ABSTRACT

2009 was the safest year on record on Irish roads since records began in 1959. There were 240 deaths on Irish roads, which represent a 14% reduction from 2008 figures. Despite these improvements, 40% of all road deaths in 2009 occured in those aged under-25 years of age. Globally road traffic collisions represent the principal cause of ill-health and premature death for men aged between 15 – 44 years. In 2004, 75% of road fatalities in the EU were male drivers and 20% of road fatalities were road users aged from 18-24. This paper analyses the role that speed, alcohol, dangerous driving, drug taking, fatigue, mobile phones, seat belt wearing and music play in shaping young male driver behaviour. The aim should be to understand these variables and how they interact in order to develop better social marketing campaigns aimed at changing the attitude and behaviour of young male drivers.

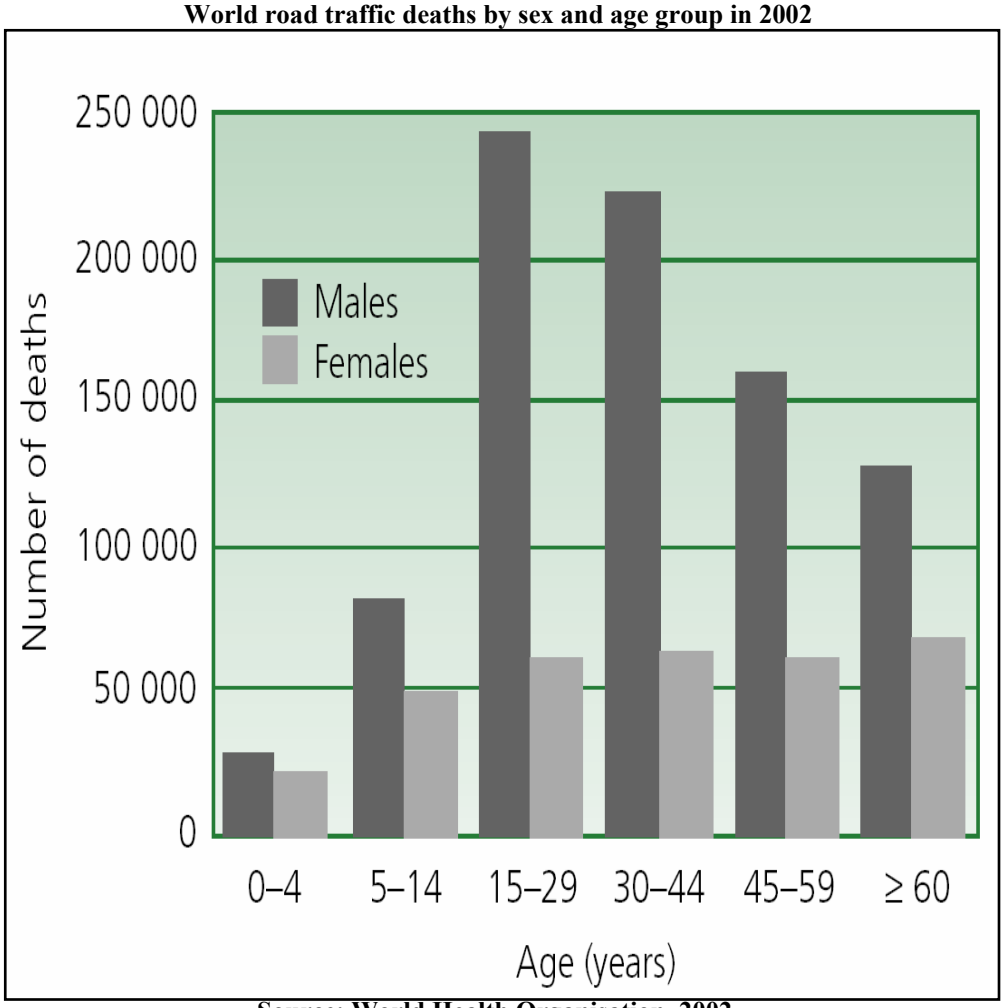
KEY WORDS

Social marketing; Young male drivers; Speed; Alcohol; Dangerous driving; Fatigue

1. INTRODUCTION

Approximately 1.18 million people died on roads worldwide in 2002 which equates to an average of 3,242 road fatalities every day (Jacobs et al. 2000). The World Health Organisation estimate, from statistics analysed in 2002 that road traffic crashes injure or disable between 20 and 50 million people worldwide every year. These estimates are based on previous research (Jacobs et al. 2000). Road traffic crashes ranked as the eleventh leading cause of death and accounted for 2.1% of all deaths globally in 2002 (Peden et al. 2004).

FIGURE 1
World road traffic deaths by sex and age group in 2002



Source: World Health Organisation, 2002.

Road traffic injuries were the second largest cause of the burden of disease in 2000 among young males aged between 5 - 29 years of age (Peden, McGee and Krug 2002). The "global burden of disease" is a tool used by the WHO to measure the health of a population. It is measured in "disability-adjusted life years" (DALYs)[1]. The term can refer to the overall impact of diseases and injuries at the individual level, at the societal level or may refer to the economic costs of the diseases. Road traffic accidents were found to be the ninth leading cause of the burden of disease globally in 1998; fifth in high income countries and tenth in low and middle income countries (Murray and Lopez 1996). By 2020, road traffic injuries are expected to rise to sixth place among the major causes of death

[1] Disability-adjusted life years (DALY) are defined as "a health-gap measure that combines information on the number of years lost from premature death with the loss of health from disability". WHO "Global Burden of Disease" study (Murray and Lopez, 1996a).

worldwide. It is also projected that road collisions will represent the third leading cause of DALY's lost by 2020 (Murray and Lopez 1996). Men aged between 15 and 44 years of age accounted for over half of all road deaths globally as depicted in figure 1 (Peden, McGee and Sharma 2002).

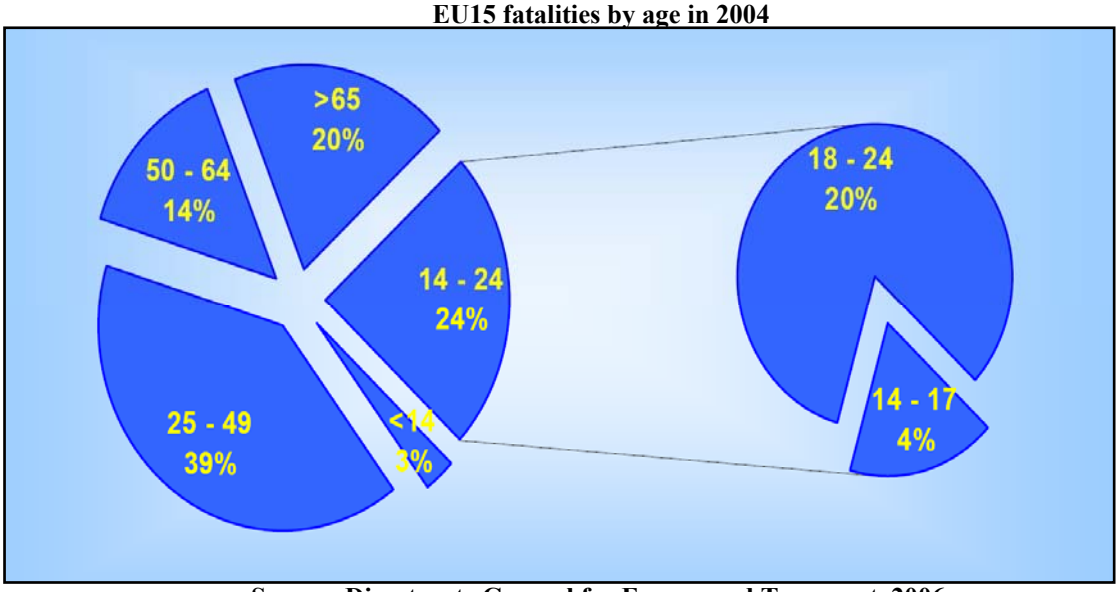
2. THE YOUNG MALE DRIVER

Definitive figures relating to road fatalities and injuries worldwide are impossible to compile. Only 75 of the 192 countries worldwide report annual data on road traffic injuries. However the WHO estimates that 73% of all traffic fatalities are male road users (WHO 2002). These figures were derived from the WHO Mortality Database as well as studies conducted by the Transport Research Laboratory and the World Bank (Kopits and Cropper 2003; Jacobs et al. 2000). Road traffic collisions represent the principal cause of ill-health and premature death for men aged between 15-44 years (Peden, McGee and Sharma 2002).

According to the European Road Safety Action Programme Mid Term Review, there were 50,000 road fatalities in 2001 within countries which represent the EU25. The review estimated there were approximately 41,600 road fatalities in the EU25 for 2005. This figure represents a marked improvement (17.5% reduction) since 2001. However this rate of improvement is considered too sluggish over the four year period. Unless the rate of improvement accelerates dramatically the goal of a fifty per cent reduction in road deaths within the EU by 2010 will not be achieved (Directorate General for Energy and Transport 2006).

In 2004, 76% of road fatalities in the EU were male drivers. The high representation of men in road fatalities is a longitudinal trend that is observed each year across the EU (Directorate General for Energy and Transport 2006). Figure 2 provides a breakdown of EU road fatalities by road user age. Twenty per cent of road fatalities were road users aged from 18 - 24 years in 2004 and nearly 60% were aged within the 18 – 49 age group (Directorate General for Energy and Transport 2006).

FIGURE 2
EU15 fatalities by age in 2004



Source: Directorate General for Energy and Transport, 2006.

There are elevated risks associated with young car drivers between 18 - 25 years of age. This narrow age profile is over-represented in road fatality figures across Europe. The high car dependency rates in the EU result in high fatality figures among car drivers. In 2004, 67% or 2 in every 3 road fatalities

were car users. Seventy per cent of road fatalities among 18 - 25 year old road users, within the EU in 2004, were the result of car accidents (Directorate General for Energy and Transport 2006).

TABLE 1
Road fatalities in member states by gender and age in 2002

	16-25	26-40	41-60	61-99	Female	Male
Belgium*	26%	34%	24%	17%	21%	79%
Denmark	22%	35%	21%	22%	21%	79%
Greece*	20%	34%	31%	16%	8%	92%
Spain	22%	36%	27%	15%	14%	86%
France	28%	29%	25%	19%	22%	78%
Ireland	27%	35%	17%	20%	24%	76%
Italy**	23%	32%	25%	20%	15%	85%
Luxembourg	13%	53%	29%	5%	16%	84%
Netherlands	34%	27%	22%	16%	19%	81%
Austria	31%	28%	23%	18%	21%	79%
Portugal	24%	37%	26%	14%	15%	85%
Finland	23%	22%	32%	22%	19%	81%
Sweden	21%	23%	29%	27%	15%	85%
UK	31%	29%	21%	19%	23%	77%
Total	26%	31%	25%	18%	18%	82%

* Data from 2001
** Data from 1998
Source: CARE Database / EC
Date of query: February 2005

Table 1 provides a breakdown of road fatalities by age and gender in a number of EU member states. It serves to highlight the over representation of male drivers in road fatalities across Europe. This cross-sectional glimpse at road fatalities in 2002 (unless where stated) gives an indication of the problem throughout Europe. The data finds that male road users are between 3 and 6 times more likely to be killed than female road users (SafetyNet 2004).

Clarke et al., (2002) and Ward et al., (2005) found that a high number of young drivers were involved in loss of control crashes during night time hours. The authors concluded that young drivers (17 - 19 year old drivers in particular) were the most likely to be involved in a road accident at night time and on rural roads. Research by Laapotti and Keskinen (1998) also found that fatal, loss-of-control collisions among young drivers were most prevalent in the evening and at night. Ferguson (2003) however could find no evidence of fatigue being a causal factor in night time driving. The research by Clarke et al. (2002) found high incidents of drink driving among 23-25 year old drivers. The study showed that incidents of speeding increased among young drivers at night. It was also observed that while certain crash types disappeared quickly with experience (e.g. right hand turns), crash figures for loss-of-control accidents during hours of darkness were particularly slow to improve. The authors concluded that darkness per se was not the reason for the higher crash rates but rather the purpose of the trip and mindset of the driver during these night time trips.

3. ADDICTION TO SPEED

To demonstrate the escalating effects of speeding, an example is perhaps the clearest method of explanation. For car occupants in a collision with an impact speed of 80km/h (50mph) the likelihood of death is about 20 times higher than that found at an impact at 30km/h (20mph). A 50km/h (30mph) impact is equivalent to dropping a car from a two storey building. A 100km/h impact is equivalent to

dropping that same car from an 11 storey building. Finally, a 150km/h (90mph) impact is equivalent to dropping the car from a 30 storey building (NSC 2005).

It should be noted that there is a well established link between speeding and fatalities (NSC, 2005). If a pedestrian is knocked down by a vehicle travelling at 20mph, the person has a 95% chance of survival. If struck at 30mph, the pedestrian's chance of survival drops to 55%. However, if struck by a vehicle at 40mph, the person only has a 15% chance of survival (NSC, 2005). Drivers exceeding the speed limit cause about 33% of all fatal and serious accidents. A 3 kilometre reduction in average speed would save 5,000 to 6,000 lives per annum in Europe and eradicate 120,000 to 140,000 collisions on EU roads each year. The positive economic effect alone would be €20 billion for the EU (Directorate General for Energy and Transport 2003).

An online survey by the National Safety Council in April 2003 found that Irish drivers are prone to speeding. Male drivers were found to be particularly likely to engage in speeding (NSC 2003). The survey found 46% of respondents admitted to regularly breaking the speed limit in urban areas. Similarly, almost 50% of 17 - 24 year old drivers admitted to breaking the urban zone speed limit and the majority of these drivers did so regularly. On national roads, 27% of respondents admitted to regularly breaking the speed limit. Again male drivers were found to be more likely to break the speed limit with 32% of males regularly breaking the speed limit compared to 14% of female respondents. The same trend was also observed on motorways where 26% of male respondents admitted breaking the speed limit as opposed to only 13% of female drivers (NSC 2003). The most frequently occurring error among young male drivers involved in fatal, two vehicle collisions is excessive speed. Speed accounted for 41% of all contributing factors to young male driver crashes on Irish roads in 2000. Young drivers were also more likely to engage in "improper overtaking" than older drivers (NRA 2000). This activity is especially hazardous on rural roads (where most fatal crashes occur).

Since male drivers and in particular young male drivers are over-represented in road collisions it seems reasonable to conclude that these drivers are prone to driver error. Inexperience and inappropriate speed are considered major contributors to road collisions. Much of this dangerous driving takes place on rural roads which are particularly hazardous. Ireland still has a particularly high proportion of rural, regional and local roads. Other European countries have more extensive motorway networks and are less reliant on rural roads (EuroRAP 2005).

David Watson, a safety campaign manager for the British Department of Transport contends that speeding is still a "live debate", whereas the moral debate has been won in relation to drink driving and seatbelt wearing. Therefore, while drink driving and non seatbelt compliance are now considered shameful activities, speeding still remains reasonably acceptable. During a workshop at the *Speed 2006* conference in London some of the reasons behind the enduring nature of this "live debate" were discussed. One of the problems identified with speeding is that quite often it is an unconscious act, unlike drink driving and not wearing a seatbelt, which are chiefly a question of choice. Psychologist Steve Stradling believes "…they (people) are lulled by the cocoon effect... cars are getting more and more comfortable, more and more relaxing" (Faith 1997).

4. SEATBELTS

Seatbelts have a large role to play in saving lives on European roads. Research suggests approximately 10,000 of the 22,500 car occupants killed in the EU every year could survive if they were wearing their seatbelts (ETSC 2006).

TABLE 2
Seatbelt wearing rates in the EU in 2004

Country	Wearing rate, front seats (%)	Wearing rate, rear seats (%)
Austria	77	56 (adults)
Belgium	66	n/a
Cyprus	n/a	n/a
Czech Republic	75 (driver)	n/a
Denmark	84	63
Estonia	75	21
Finland	89	80
France	97	68
Germany	94 (driver)	90 (adults)
Greece	40 (2003)	15 (2003)
Hungary	59	20 (2003)
Ireland	85 (2003)	46 (adults, 2003)
Italy	n/a	n/a
Latvia	n/a	n/a
Lithuania	n/a	n/a
Luxembourg	88 (driver)	72
Malta	95 (driver)	43
Netherlands	86 (2003)	63 (2003)
Poland	71	49
Portugal	88 (driver)	25
Slovakia	n/a	n/a
Slovenia	81	40
Spain	86 (2003)	42 (2003)
Sweden	92 (driver)	79
UK	93 (driver)	83

Source: European Transport Safety Council, 2006.

Table 2 shows the seatbelt wearing rates in the EU in 2004. Ireland has an 85% front seat wearing rate but only 46% compliance rate for back seats. In 2003, a study found that universal seatbelt use in the original EU15 member states could prevent 6,000 deaths and 380,000 injuries each year (ICF Consulting 2003). Other research estimates suggest that approximately 7,000 lives could be saved each year if seatbelt wearing rates could be increased to the best international rate. Research indicates that half of the people killed in road accidents within the EU were not wearing seatbelts (Directorate General for Energy and Transport 2003). Past research into non seatbelt compliance has indicated that young drivers and particularly young male drivers display low seatbelt compliance rates (Beirness and Simpson 1997). Research carried out in the US found that those who chose not to wear seatbelts tended to have low academic qualifications, engaged in other dangerous driving behaviours and were more likely to have previous traffic convictions (Preusser et al. 1991).

5. ALCOHOL

It is estimated that almost 10,000 road users (pedestrians, passengers or non-drinking drivers) are killed by drink drivers each year in the EU (Anderson, and Baumberg 2006). However more conservative estimates suggest between 5,000 and 7,500 road fatalities are attributable to drink driving every year in the EU25 (Directorate General for Energy and Transport 2006). In any case, alcohol continues to be a significant contributing factor in road crashes worldwide. The extent of alcohol involvement in road accidents varies among countries. In low income countries, alcohol was found to be involved in between 33% - 69% of accidents that resulted in a driver fatality (Odero and Zwi 1995). The research also found that in many high income countries approximately 20% of fatally injured drivers had a blood alcohol level (BAC) that exceeded the legal limit.

The Irish police estimate that alcohol is the primary causal factor in 25% of all road collisions and accounts for roughly 33% of fatal collisions in Ireland (An Garda Siochana 2005). However the National Safety Council estimate that alcohol accounts for 40% of road deaths and at least 30% of all road accidents in Ireland each year (DOHC 2004). A review of surveys from various EU countries concluded that at any given time, between 1% and 3% of drivers are under the influence of alcohol while driving on EU roads (ETSC 2006). These drink drivers account for 40% of all road fatalities in the EU. The research also suggests that in countries where anti drink driving enforcement is low, a reduction of up to 15% in road fatalities is achievable through increased anti drink driving enforcement activities. If Random Breath Testing levels were increased throughout the EU to the current EU average (1 breath test per 16 inhabitants) between 2,000 and 2,500 lives could be saved per year (ETSC 2006).

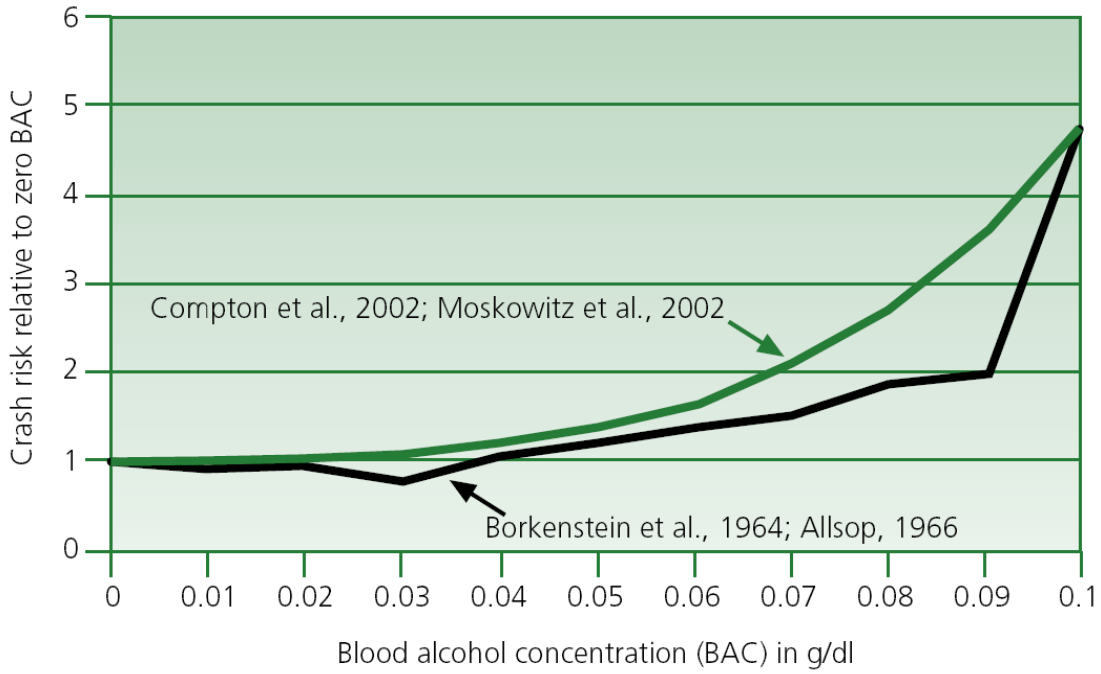
The Global Burden of Disease study in 2000 found that alcohol ranked as the third largest contributing factor to European ill-health and death. The report, found that alcohol related deaths and disabilities accounted for 9.2% of all the burden of diseases worldwide (Murray and Lopez 1996). The report also concluded that one in four deaths among young men (15 - 29 years) in Europe were alcohol related. Nearly half of alcohol related fatalities among young males were the result of a motor vehicle accident (Rehm et al. 2004). In 2002, 73% of road deaths worldwide were male road users (Murray and Lopez 1996).

Based on a review of existing studies, the total tangible cost of alcohol within the EU in 2003 was estimated to be €125 billion. This is equivalent to 1.3% of the Gross Domestic Product of the EU. The cost of alcohol related traffic accidents in terms of property damage alone was estimated to be €10 billion within the EU in 2003 (Anderson and Baumberg 2006).

Ireland has a well established drink culture. However in recent years the level of alcohol consumption in Ireland has increased dramatically. From 1989 – 1999 there has been a 41% increase in the consumption of alcohol in Ireland. The average alcohol consumption in the EU was 9.1 litres of pure alcohol per capita in 2000. Ireland's average alcohol consumption in 2002 was 14.2 litres of pure alcohol per capita (DOHC 2004). Ramstedt and Hope (2003) found that 58% of drinking occasions among Irish men evolved into binge drinking sessions. Irish men were found to be the most prolific binge drinkers in Europe. The study defined binge drinking as (75/80 grams of pure alcohol ingested per drinking session) which corresponds to at least one bottle of wine, seven measures of spirits or four pints of beer. Binge drinking is particularly pronounced among young Irish men between the ages of 18 - 29 years. The data suggests that Irish male teenagers carry on the learned habits of binge drinking even as they grow to driving age. The average number of drinks consumed before injury was sustained was found to be 15 drinks for males and 11 drinks for females (Hope et al. 2005). This data has grave implications for road safety in Ireland as a new generation of binge drinking adolescents come of driving age.

The risk involved in drink driving increases with both the amount of alcohol consumed and the frequency of high volume drinking occasions. The risk also rises in tandem with blood alcohol concentration levels (Hingson and Winter 2003). The legal blood alcohol concentration (BAC) for drivers in Ireland is 80mg/100ml. However at a fraction of this (BAC) level, driver impairment is found to result. The Grand Rapids study by Borkenstein et al., (1964) laid the foundation for the widely adopted 0.08g/dl (80mg/100ml) BAC seen in many countries including Ireland. However new research findings (as seen in Figure 3) suggest that the risk of an accident is much higher than previously estimated (Compton et al. 2002; Moskowitz et al. 2002).

FIGURE 3
Relative risk of driver involvement in police-reported crashes



Research has found that male and female drivers of all ages who had a BAC of between 20mg/100ml and 49mg/100ml were at least 3 times more likely to be involved in a fatal single vehicle crash than sober drivers. This risk was found to increase to at least 6 times with BAC between 50mg/100ml and 79mg/100ml and 11 times with a BAC between 80mg/100ml and 99mg/100ml (Zador et al. 2000). Even a relatively low BAC (20mg/100ml of alcohol) can impair driving if the driver is suffering from sleep deprivation (Anderson and Baumberg 2006: 146).

At one eighth of the legal Irish BAC limit (10mg/100ml) a driver's ability to divide their attention between two or more tasks is reduced according to National Safety Council literature[1]. At one quarter of the legal Irish BAC (20mg/100ml) the driver can experience drowsiness and retardation in cognitive skills such as sign reading. Psychomotor skills such as body balance and body movement which dictate the driver's perceptual ability to control the car are also compromised (Moskowitz and Fiorentino 2000). A study by Borkenstein et al. (1964) found that in high volume traffic, where elevated levels of attention and concentration are required, a BAC of between 10mg/100ml and 40mg/100ml is associated with an increased risk of an accident.

The research by Moskowitz and Fiorentino (2000) suggests that at a BAC of between 20mg/100ml - 50mg/100ml, judgement levels are already impaired. Rudimentary decisions such as gauging distance and the speed of oncoming vehicles is affected. As a result the driver is more likely to engage in risky

[1] "Impairment and blood alcohol concentration by behavioural area" fact sheet.

overtaking manoeuvres. At a 50mg/100ml BAC level there is twice the chance of a road traffic collision occurring in relation to the crash risk associated with a zero BAC level. The research found that reaction times are slower among drivers with a BAC of between 50mg/100ml and 80mg/100ml. Driver perception is also impaired as are the vigilance levels of the driver. At roughly three quarters of the Irish legal BAC (50mg/100ml) the driver's tracking ability (includes the ability to negotiate the vehicle within the driver's lane) is adversely affected. Having reviewed 112 studies Moskowitz and Fiorentino found that 80mg/100ml was the BAC level at which 50% of behavioural tests indicated consistent driver impairment. The review provided strong evidence to indicate that driver impairment results with any departure from a zero blood alcohol concentration level (Moskowitz and Fiorentino 2000).

There were 301 fatal crashes resulting in some 335 road fatalities in the Republic of Ireland in 2003. Of these 301 fatal road crashes, the study found that 110 (36.5%) of these crashes were alcohol related (Bedford et al. 2006). The study also found that 64 (34%) of the drivers killed in 2003 were over the legal alcohol limit. Furthermore, the research indicated that 76 (40.3%) of the drivers killed had blood alcohol levels in excess of 20mg/100ml. The results of the study indicated that 89.7% of the drivers who were involved in fatal, alcohol related collisions were male drivers (Bedford et al. 2006). Male drivers between the ages of 19 - 34 years were found to be the most likely to be killed on Irish roads whilst under the influence of alcohol. The report also found that young male passengers between 15 - 24 years of age exhibited the highest mortality rates of all passengers. The data established that 46% of male passengers were killed in crashes where a driver's alcohol level was a contributory factor in the crash. In 2003, approximately one in five of all road fatalities was a passenger (20.9%). Male passengers represented 55.7% of all passengers killed in 2003 (Bedford et al. 2006).

6. DANGEROUS DRIVING

There are a variety of dangerous driving behaviours that can be perpetrated by a driver. Some of these dangerous behaviours are more prevalent among young drivers. The SARTRE 3 study profiled the most dangerous drivers on European roads. The study found the most dangerous drivers on European roads were 18 - 24 year old drivers. It found that, on average, 10% of young drivers (18 - 24 year olds) believed they are dangerous drivers. This is over twice the perceived rate found among any other age profile. These drivers were usually single students who had a secondary education and drove cars with an engine capacity of between 1300cc - 1900cc (INRETS 2004). Young male and female drivers were found to drive vehicles that were between 6 - 10 years old. The age of the vehicles is speculated to contribute to the elevated fatality rates among younger drivers given that older cars typically offer the occupants less protection than newer cars.

While young drivers shared many personal characteristics, gender specific differences did manifest themselves in the data. It was found that young male drivers were more likely to admit to driving in a dangerous manner than their female counterparts. There was also a marked contrast in the levels of driving experience between the two sexes. High risk female drivers were generally found to have driven less than 5,000km a year while high risk young male drivers usually drove in excess of 30,000km per year. Therefore it has been suggested that there are different reasons why both sexes consider themselves to be dangerous drivers. In the case of female drivers the most probable reason is a lack of confidence which stems from their perceived lack of driving experience. Therefore female drivers may feel that they are dangerous drivers due to a general underestimating of their driving ability. The same cannot be said for young male drivers who often drive over 6 times the distance of female drivers. Young men who contend that they are dangerous drivers are more likely to base this opinion on their driving style rather than any deficiency in driving experience. Therefore young male drivers, in contrast to young female drivers are more likely to overestimate their driving skills. This often results in dangerous driving behaviours (INRETS 2004).

7. MOBILE PHONES

Research by the National Highway Traffic Safety Administration (NHTSA) suggests that driver distraction and inattention could play a role in 20% - 30% of all road crashes (Wang, Knipling and Goodman 1996). A survey of 1,000 drivers in the UK found that 30% of drivers used a mobile phone while driving and 33% of these drivers often did so. The study found that young male drivers and high mileage drivers were most likely to use a phone while driving (Green Flag 2000). Observational studies in the US, Australia and the UK found that there are typically between 1% - 4% of drivers using a mobile phone while driving at any given time of the day (TRL 2004). These studies consistently showed that male drivers and young drivers (younger than 30 years of age) tended to use their mobile phones more frequently while driving than any other drivers. Drivers under thirty years of age were almost twice as likely to use a mobile phone while driving when compared to older drivers (TRL 2004).

An extensive three year study of 223,137 road crashes in the state of Oklahoma between 1992 and 1995 found that both the presence of, or use of a mobile phone in a car, statistically increased the risk of a traffic fatality. The study determined that drivers who used their mobile phones while driving were roughly 9 times more likely to be involved in a fatal crash than drivers who refrained from using their phones (Violanti 1998). A literature review of mobile phone studies concluded that there are five readily identifiable effects of mobile phone use on driving performance. The five most commonly occurring effects in the data are; slower reaction times to traffic signals and signs, decreased general and situational awareness, risky decision making, slower reaction times in braking situations, and risk compensating behaviours (Dragutinovic and Twisk 2005).

8. FATIGUE

Numerous studies have established a link between fatigue and road accidents (Mahowald 2000). Some estimates suggest that up to approximately 20% of crashes can be linked to fatigue (Horne et al. 2003). Research has established that young drivers are particularly susceptible to fatigue related road accidents (Lyznicki et al. 1998). Male drivers have been found to be more frequently involved in night-time car accidents (Lyznicki et al. 1998; Horne and Reyner 1995). This is possibly due to young male drivers being the largest driver group on the roads during the early morning hours (Horne and Reyner 1995). While truck drivers are a high risk group in terms of sleep related accidents, research by Lyznicki et al. (1998) found that young drivers represent a much larger risk group among night-time drivers. Studies suggest that young drivers are 4 times more likely to be involved in a crash where the driver falls asleep at the wheel than other drivers. The research also found that young drivers account for nearly 66% of all sleep related crashes (Horne and Reyner 1995).

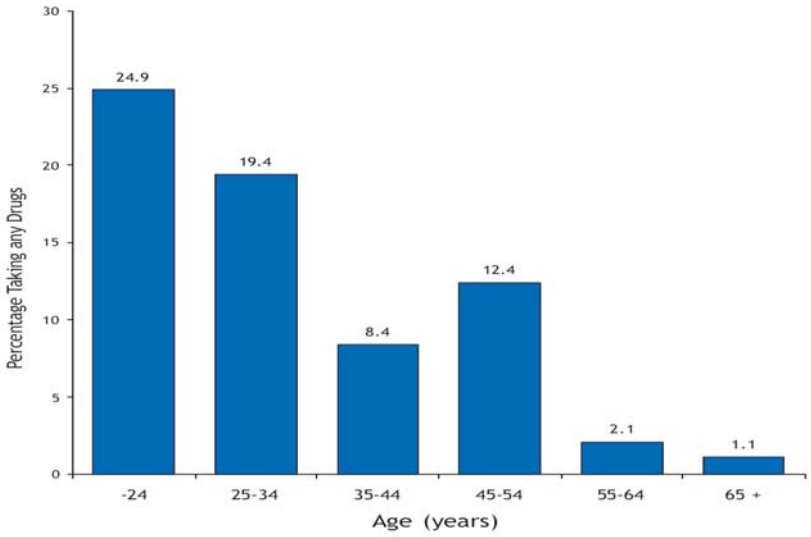
Data from a range of studies suggests that young male drivers under thirty years of age are predisposed to early morning sleep related crashes (Lyznicki et al. 1998; Horne and Reyner 1995). Young drivers (18 - 24 years of age) are 5 - 10 times more likely to crash at night than during the afternoon (Akerstedt and Kecklund 2001). Research suggests that fatigue related crashes are likely to be more severe and display higher mortality rates than other accident types (Akerstedt and Haraldsson 2001). Summala and Mikkola (1994) suggest that young drivers' inexperience and scant knowledge of fatigue coping strategies may account for the relative high fatigue related crashes among young drivers. However research indicates that when drivers become very tired it is impossible to counteract sleep and coping strategies become redundant (Dinges 1992).

9. DRUG TAKING

From 2000 – 2001 the Medical Bureau on Road Safety conducted a nationwide study on drug driving. The survey tested 1,000 samples that were found to have an alcohol level over the Irish legal limit and 1,000 samples found to be under the Irish legal limit. Both groups were tested for the presence of drugs so as to facilitate a comparative analysis. The survey found that 60% of those samples with

essentially zero alcohol levels (less than 10mg/100ml) tested positive for one or more drugs. Ninety per cent of the samples in the study were taken from male drivers whom the Irish police had stopped. This high representation of male drivers in the survey suggests that the Irish police are focusing their detection efforts on male drivers whom they consider to be a high risk group (Cusack et al. 2003).
As the levels of alcohol increased in the tested samples a general downward trend in drug taking was observed in driver samples (Cusack et al. 2003). Only 11.1% of drivers with a blood alcohol level of greater than 200mg/100ml tested positive for other drugs.

FIGURE 4
Prevalence of drug taking by age in Irish drivers



Source: Cusack et al., 2003.

Figure 4 highlights the high trend in drug taking among young Irish drivers when compared to older Irish driver demographics. Young drivers (under 24 years of age) were found to represent 24.9% of all drug taking drivers (Cusack et al. 2003). According to the MBRS, the typical drug driver is a young, sober, urban, male driver out driving between the hours of 6 a.m. - 9 a.m. (Cusack et al. 2003).

10. ROLE OF MUSIC

Research has suggested a link between loud music and impaired driving (Beh and Hirst 1997). Their research involved evaluating sixty subjects between the ages of 20 - 28 years. The subjects were asked to perform simulated driving tests in a driving simulator under three different noise conditions; silence, rock music played at 55 decibels (quiet music) and the same rock music played at 85 decibels (loud music). The results showed that when listening to quiet and loud music the test subjects stopped 50 milliseconds quicker at red lights than when driving in silence. The experiment also found that drivers listening to quiet music responded to objects in their central field of vision 50 milliseconds faster than those driving in silence. However those who drove while listening to loud music were found to be 100 milliseconds slower than those listening to quiet music and 50 milliseconds slower than drivers who drove in silence. When the drivers were tested for their reaction times to objects entering their periphery vision, the subjects showed a delayed reaction time of 100 milliseconds when listening to loud music. The overall results suggest that quiet music has a beneficial arousal effect which translates into faster reaction times. By contrast, loud music acts as a distraction and retards reaction times especially in difficult driving situations where there is a high mental load on the driver.

There has also been research to suggest that high tempo music promotes dangerous driving (Brodsky 2002). It was found that drivers listening to high tempo music (up to 120 beats per minute) were more likely to engage in risky driver behaviour and were twice as likely to run red lights. Accidents were also more prevalent among the subjects who listened to faster tempo music. The experiment also

found that drivers listening to music did not experience the same fluctuation in heart rate as those drivers who drove without music. It was concluded that music makes drivers less alert to driving hazards and as a result their heart rate remained low throughout the simulated journey (Brodsky 2002). Due to the limited nature of the experiment (driving simulator) and the small sample size (twenty eight subjects) the findings must be treated with caution.

11. CONCLUSIONS

This paper has shown the reasons why young male drivers are over-represented in road traffic collisions, fatalities and injuries. These reasons are seen in all developed countries. There is no one cause for this trend and as the paper shows, it is a mult-faceted area. Therefore social marketers will have to consider a complex mix of variables when analysing an appropriate strategy to target this segment.

REFERENCES

- Akerstedt T and Haraldsson P (2001) International consensus meeting on fatigue and the risk of traffic accidents: The significance of fatigue for transportation safety is underestimated. Lakartidningen, 98 (25), 3014-3017
- Akerstedt T and Kecklund G (2001) Age, gender and early morning highway accidents. Journal of Sleep Research, 10, 105-110
- An Garda Siochana (2005) Garda road safety activities - Christmas 2005. Available: http://www.garda.ie/angarda/press/2005/p1dec05.html, [5 Nov 2006]
- Anderson P and Baumberg B (2006) Alcohol in Europe - A Public Health Perspective. Institute of Alcohol Studies, London
- Bedford D, McKeown N, Vellinga A and Howell F (2006) Alcohol in fatal road crashes in Ireland in 2003. Population Health Directorate, Health Service Executive, Naas
- Beh HC and Hirst R (1997) The effects of loud music on simulated driving performance. In: Cromie SD, Forrest DW, Gallagher AG, O'Connell M, Quigley J, Smith H, Tierney K.J. and Trimble TJ (Eds.) Proceedings of the Fifth European Congress of Psychology. Psychological Society of Ireland, Dublin
- Beirness DJ and Simpson HM (1997) Study of the profile of high-risk drivers. Transport Canada and Traffic Injury Research Foundation, Ottawa, Canada
- Borkenstein RF, Crowther RF, Shumate RP, Ziel WB and Zylman R (1964) The role of the drinking driver in traffic accidents. Department of Police Administration, Indiana University, Bloomington, Indiana
- Brodsky W (2002) The effects of music tempo on simulated driving performance and vehicular control. Transportation Research part F, 4, 219-241
- Clarke D, Ward P and Truman W (2002) In-depth accident causation study of young drivers (T.R.L. Report TRL 542). Transport Research Laboratory (T.R.L.), Crowthorne, Berkshire, UK
- Compton RP, Blomberg RD, Moskowitz H, Burns M, Peck RC and Fiorentino D (2002) Crash risk of alcohol impaired driving. In: Mayhew D.R., Dussault, C. (eds.), Proceedings of the 16th International Conference on Alcohol, Drugs and Traffic Safety, Montreal, 4-9 August 2002. Quebec: Sociétie de l'Assurance Automobile du Québec, 39-44
- Cusack DA, Leavy CP, Daly L and Fitzpatrick P (2003) Driving under the influence of drugs in Ireland: Results of a nationwide survey 2000 - 2001. Medical Bureau of Road Safety (M.B.R.S.), Department of Forensic Medicine, University College, Dublin, Ireland
- Department of Health and Children (D.O.H.C.) (2004) Strategic Task Force on Alcohol - Second Report (ISBN 0-9544914-2-4.). Strategic Task Force on Alcohol, Dublin, Ireland

- Dinges D (1992) Probing the limits of functional capability: The effects of sleep loss on short duration task. In: Broughton, R., and Ogilvie, R. (Eds.), Sleep, Arousal and Performance. Birkhauser-Boston Inc, 176-188
- Directorate General for Energy and Transport (2003) Saving 20,000 lives on our Roads: A Shared Responsibility (ISBN 92-894-5893-3). Office for Official Publications of the European Communities, Luxembourg. Available: http://europa.eu.int/comm/transport/road/library/rsap/rsap_en.pdf, [26/01/06]
- Directorate General for Energy and Transport (2006) Communication from the Commission: European Road Safety Action Programme Mid-Term Review (COM (2006) 74 final, SEC (2006) 221). EU Commission, Brussels, 22 February 2006
- Dragutinovic N and Twisk D (2005) Use of mobile phones while driving - effects on road safety (R-2005-12). SWOV Institute for Road Safety Research. The Netherlands
- European Road Assessment Programme (EuroRAP) (2005) Ireland Results: Risk rating Ireland's major roads (03/2005/ERO6/PA164). AA Ireland, The AA Motoring Trust and EuroRAP AISBL, March 2005
- European Transport Safety Council (E.T.S.C.) (2006a) Promoting Seat Belt Use (fact sheet no. 12). European Transport Safety Council, Brussels, April 2006. Available: http://www.etsc.be/documents/FactSheet_Seat_Belt_Use_2006.pdf,[01/02/07]
- Faith N (1997) Crash: The limits of car safety. London
- Ferguson SA (2003) Other high risk factors for young drivers: How graduated licensing does, doesn't, or could address them. Journal of Safety Research, 34 (1), 71-77
- Green Flag (2000) The Green Flag Report on Safe Driving. Green Flag Motoring Assistance, London
- Hingson R and Winter M (2003) Epidemiology and consequences of drinking and driving. Alcohol Research and Health, 27, 63-78
- Hope A, Gill A, Costello G, Sheehan J, Brazil E and Reid V (2005) Alcohol and Injuries in the Accident and Emergency Department: A National Perspective. Health Promotion Unit, Dublin
- Horne J and Reyner L (1995b) Sleep related vehicle accidents. British Medical Journal, 310, 565-567
- Horne J, Reyner LA and Barrett PR (2003) Driving impairment due to sleepiness is exacerbated by low alcohol intake. Journal of Occupational and Environmental Medicine, 60, 689-692
- ICF Consulting (2003) Cost-Benefit Analysis of Road Safety Improvement (Final Report). Imperial College Centre for Transport Studies. London, 12 June 2003. Available: http://ec.europa.eu/transport/road/library/icf_final_report.pdf, [04/11/06]
- Institut National de Recherche sur les Transports et leur Sécurité (I.N.R.E.T.S.) (2004) European drivers and road risk SARTRE 3 reports: Part 1 Report on principal analyses. Institut National de Recherche sur les Transports et leur Sécurité. Paris. Available: http://sartre.inrets.fr/documents-pdf/repS3V1E.pdf, [09/02/07].
- Jacobs G, Aeron-Thomas A and Astrop A (2000) Estimating global road fatalities (T.R.L. Report, No. 445). Transport Research Laboratory (T.R.L.), Crowthorne, Berkshire, UK
- Kopits E and Cropper M (2003) Traffic fatalities and economic growth (Policy Research Working Paper No. 3035). The World Bank, Washington, D.C.
- Laapotti S and Keskinen E (1998) Differences in fatal loss-of-control accidents between young male and female drivers. Accident Analysis & Prevention, 30 (4), 435-442
- Lyznick IJ, Doege T, Davis R, Williams M (1998) Sleepiness, driving, and motor vehicle crashes. Council on scientific affairs, Journal of American Medical Association, 279 (23), 1908-1913
- Mahowald M (2000) Eyes wide shut. The dangers of sleepy driving. Minnesota medicine, 83 (8), 25-30

- Moskowitz H and Fiorentino D (2000) A review of the literature on the effects of low doses of alcohol on driving-related skills. Springfield, VA, United States Department of Transportation, 2000 (NHTSA Report No. DOT HS-809-028)
- Moskowitz H, Blomberg R, Burns M, Fiorentino D, Peck R (2002) Methodological issues in epidemiological studies of alcohol crash risk. In: Mayhew D.R. and Dussault, C. (eds.), Proceedings of the 16th International Conference on Alcohol, Drugs and Traffic Safety, Montreal, 4-9 August 2002. Montreal, Société de l'assurance automobile du Québec, 45-50
- Murray CJL and Lopez AD (eds) (1996a) The global burden of disease: A comprehensive assessment of mortality and disability from diseases, injuries, and risk factors in 1990 and projected to 2020. Harvard School of Public Health, Boston, MA
- National Roads Authority (N.R.A.) (2000) Young Driver Accidents 2000 (RS 459). (ISBN 1 900293 65 X). National Roads Authority, Dublin. Available: http://www.nra.ie/PublicationsResources/DownloadableDocumentation/RoadSafety/file,384,en.PDF, [09/02/07]
- National Safety Council (N.S.C.), (2003). Survey of Irish Driver Attitudes. National Safety Council, Dublin
- National Safety Council (N.S.C.), (2005). Cause of road crashes. National Safety Council, Dublin
- Odero WO and Zwi AB (1995) Alcohol-Related Traffic Injuries and Fatalities in Lower and Middle Income Countries: A Critical Review of Literature. In: Proceedings of the 13th International Conference on Alcohol, Drugs, and Traffic Safety, Adelaide, 13–18 August 1995, (ed.), Kloeden, C.N. and McLean, A.J. 713-720. Adelaide, Australia: Road Accident Research Unit
- Peden M, Scurfield R, Sleet D, Mohan D and Hyder AA (eds) (2004) World Report on road traffic injury prevention (Summary) (ISBN 92 4 159131 5). World Health Organisation (W.H.O.), Geneva, 2004. Available: http://www.who.int/world-health-day/2004/infomaterials/world_report/en/summary_en_rev.pdf, [14/02/07]
- Peden M, McGee K and Krug E (eds.) (2002) Injury: A leading cause of the global burden of disease 2000. World Health Organisation (W.H.O.), Geneva
- Peden M, McGee K and Sharma G (2002) The injury chart book: A graphical overview of the global burden of injuries. World Health Organization (W.H.O.), Geneva
- Preusser DF, Williams AF and Lund AK (1991) Characteristics of belted and unbelted drivers. Accident Analysis and Prevention, **23**, 475-482
- Ramstedt M and Hope A (2003) The Irish drinking habits of 2002: Drinking and drinking-related harm, A European comparison. Dublin: Department of Health and Children
- Rehm J, Room R, Monteiro M, Gmel G, Graham K, Rehn T, Sempos CT, Frick U and Jernigan D (2004) In: W.H.O. (ed), Alcohol: Comparative quantification of health risks: Global and regional burden of disease due to selected major risk factors. Ezzati M, Lopez AD, Rodgers A and Murray CJL, World Health Organisation (W.H.O), Geneva
- SafetyNet (2004a) Traffic Safety Basic Facts 2004 - Car Occupants. Directorate General for Energy and Transport, Community Road Accident Database (C.A.R.E.) Available:http://www.erso.eu/safetynet/Fixed/WP1/2004/SN-TRL-1-3-BFS-Car_occupants_022005.pdf, [06/10/06]
- Summala H and Mikkola T (1994) Fatal accidents among car and truck drivers: Effects of fatigue, age and alcohol consumption. Human Factor 36, 315–326
- Transport Research Laboratory (T.R.L.) (2004) Mobile phone use by drivers, 2002 - 2004 (TRL LF2094). Transport Research Laboratory (T.R.L.). Crowthorne, Berkshire, UK
- Violanti JM (1998) Cellular phones and fatal traffic collisions. Accident Analysis and Prevention, 30 (4), 519-524
- Wang J, Knipling RR and Goodman MJ (1996) The role of inattention in Crashes: New statistics from the 1995 crashworthiness data system (CDS). 40th Annual Proceedings: Association for the Advancement of Automotive Medicine, 377-392

- Ward H, Shepherd N, Robertson S and Thomas M (2005) Night-time accidents - A scoping study. Centre for Transport Studies, University College London
- World Health Organisation (W.H.O.) (2002) Global Burden of Disease project, 2002, Version 1. World Health Organisation (W.H.O.), Geneva
- Zador P, Krawchuk S and Voas R. (2000) Alcohol-related relative risk of driving fatalities and driver impairment in fatal crashes in relation to driver age and gender: an update using 1996 data. Journal of Studies on Alcohol, 61, 387-395.